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I, JULIE BILLINGSLEY, TEAM LEADER EXAMINATION SUPPORT AND SALES hereby certify that annexed is a true copy of the Provisional specification in connection with Application No. 2004900450 for a patent by CTECH EQUIPMENT PTY. LTD. as filed on 03 February 2004.

I further certify that the above application is now proceeding in the name of CTECH CLOSURES PTY LTD pursuant to the provisions of Section 113 of the Patents Act 1990.

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WITNESS my hand this
Twelfth day of August 2004

A handwritten signature in cursive script, reading "J. Billingsley".

JULIE BILLINGSLEY
TEAM LEADER EXAMINATION
SUPPORT AND SALES



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IMPROVEMENTS RELATING TO A TAMPER EVIDENT RING FOR A CONTAINER CLOSURE AND CONTAINER NECK WITH CORRESPONDING ANNULAR TAMPER BEAD

This invention relates to a tamper evident ring for a container closure and a container neck. In particular it relates to a ring which if required can be retained on a container neck when the container closure has been removed.

A known design of tamper evident ring includes a plurality of frangible connections or bridges initially joining the ring to the container closure, and a plurality of solid radial ramp projections or protrusions to engage behind an annular tamper bead on the container neck. When the closure is removed for the first time, the projections engage the annular tamper bead to retain the ring on the neck, thus causing the frangible bridges between the ring and the closure to become severed. The ramp shape of the projections is intended to allow the ring to be fitted easily over the tamper bead, but not easily removed.

However, a problem with this design is achieving reliability in use. Typically, this sort of ring might be about 80% reliable. If the projections are too small, the ring will be not retained securely on the neck, and it might remain intact with, or at least partly intact with, the closure when the closure is removed for the first time. Besides it being inconvenient for a user to have to separate the ring from the closure manually once the closure has been removed, this also means that the ring cannot give a guaranteed tamper-proof indication.

However if the projections are large to ensure that the ring will be retained reliably on the neck, it can then be difficult to fit the ring initially on the neck without risking damage to some of the frangible bridges.

Prior art (AU 701668) teaches us the use of a second means of engagement between the protrusions on the annular tamper ring on the closure and protrusions on the neck of the container (i.e. neck protrusions other than the tamper bead on the neck of the container) such that this second means of engagement between the tamper ring and the container prevents unscrewing movement of the tamper ring greater than one half turn of rotation whereupon the said secondary engagement means becomes effective and further rotation to remove the closure causes the severing of the frangible bridges between the annular tamper ring and the skirt of the cap.

With the majority of sealing methods the interaction between the closure means and the container neck occurs over a very small axial distance such that one half turn of the closure in the direction of removal, would remove the sealing means from juxtaposition with the container neck thereby allowing atmosphere and potential contaminants to enter into the container even though the tamper ring on the closure has not been broken.

There is also the need for either designing the frangible bridges with a cross section to impart sufficient strength to withstand the rigours of cap sorters and application onto the container but yet be sufficiently frangible to allow removal by persons of limited strength in hands and or wrists.

The present invention has been devised with the above problems in mind, and with the particular aim of providing an improved design both of tamper evident ring and co-operating features on the container neck.

Examples of non limiting aspects the invention are as follows provides a closure means having a tamper evident ring, a corresponding container neck for a container closure assembly consisting:

a container neck with an annular tamper bead which may be continuous or segmented and ramped or tapered in such direction to minimise interference between the neck and the closure during application of the closure but shaped as to present an angled surface to engage with a corresponding angled surface on the annular tamper ring on the closure such that rotation motion to remove the closure causes engagement of the co-operating angled surface or surfaces on the neck of the container and the tamper ring on the closure such that further unscrewing movement creates both lateral and axial stress on the frangible connections between the annular tamper ring and the skirt causing separation of the tamper ring from the closure.

To allow the closure tamper ring to move away from the closure skirt there must be sufficient free space on the neck below the tamper bead to allow such movement of the closure tamper ring. Such free space may be calculated as 130% of the height of the closure tamper ring

One or more angled ramps may be added below the tamper bead such that there is co-operation between the said angled ramp and the protrusions or flaps on the closure tamper ring so that after application there remains sufficient interference between closure and the said angled ramp below the tamper bead on the container neck that upon severing of the closure tamper ring from the closure skirt the closure tamper ring moves away from the skirt thus giving clear visual evidence of tampering or opening. The said angled ramps may also be shaped so as to engage with the protrusions on the closure tamper ring upon removal rotation of the closure to effect or assist in effecting sufficient interference to break the frangible bridges between the closure skirt and the closure tamper ring

The container tamper bead may be segmented into regular or irregular sections with each section ramped to present reduced interference to the closure upon application rotation but also shaped so as to present interference with the closure tamper ring protrusions and or flaps upon removal rotation of the closure. The said segments are ideally spaced at least so that maximum gap between the segments is less than the length of the corresponding engagement protrusions and or flaps on the closure tamper ring thus ensuring that the closure tamper ring engagement protrusions and or flaps engage with the container tamper bead segments to effect separation of the closure tamper ring from the skirt.

A segmented tamper bead with segments that are ramped or shaped or tapered to minimise friction or resistance or engagement with the closure means on application of the said closure means and also shaped so as to present a surface to engage the direction of many connections between they may also be shaped in such a way or of such dimension as to by engagement by some means with a device on the closure tamper ring thereby facilitate a retention means to retain the tamper evident ring on the neck of the container. However, there is a desirable benefit to the recycling process if the container is not burdened with a tamper ring of different material as is the case with most closures in use today.

The said container neck tamper bead may also be advantageously angled and or shaped and or located to co-operate most effectively with the tamper ring engagement means on the closure tamper ring to produce axial and or rotational stress to sever the frangible bridges between the tamper band and the closure skirt. The axial stress may be facilitated by co-operation between the tamper bead engagement means on the closure with the underside of the tamper bead.

A closure consisting of :

- a) a top disc portion which has on its inside or lower surface sealing means to thereby engage one or more of the inside of the neck, the uppermost portion of the neck and the outside of the container neck or have provision for insertion of various liner materials as a sealing means and. In one non limiting embodiment the sealing means on the inside of the closure top disc may locate and seal on the inside circumference of the neck of the container at such distance below the top of the neck of the container when fully applied that removal rotation of the closure will not breach the seal between the closure and the inside of the container neck until after the tamper evidence means operates.
- b) a depending skirt with internal thread or thread sections corresponding with the threaded container neck and

- c) an annular tamper evident ring frangibly depending from the skirt
- i) with one or more protrusions so ramped or shaped as to present less resistance upon application of the closure and shaped so that upon unscrewing movement engagement occurs with the underside of the tamper bead on the container neck thus preventing removal of the tamper band and cause the frangible bridges to break thereby evidencing tampering or opening of the closure..
- Such protrusions may take the form of one or more flaps which compress or fold inwards against the inside wall of the closure as the flaps pass over the tamper bead on the neck of the container and spring back from the inside wall of the closure and engage with the neck of the container below the tamper bead such that upon removal of the closure the said flaps will engage beneath the said tamper bead and cause the frangible bridges to break thereby evidencing tampering or opening of the closure.

The present invention also extends in a non limiting manner to any one or more of the foregoing aspects combined with one or more of the following:-

various child resistant features one of which may be of the type whereby it is necessary to exert downward force either on the top of the closure or on the top of an over-cap which fits over the top of the closure, such that the downward force overcomes resistance thereby allowing engagement means between the over-cap and the closure to enable removal rotation of the closure to operate the tamper evident feature and remove the closure from the neck of the container.

The concept of moulding the closure from more than one type of material. For example it would assist recycling if the closure tamper ring was moulded in the same material as the container.

Various dispensing means such as, but not limited to, a flexible membrane with cruciform or other pattern slits or openings to thereby permit the dispensing of container contents or a pump action dispenser or a push/pull valve closing/ opening feature.

A closure applied by axial rather than rotational motion.

A closure with cooperating ratchet or engagement means between the skirt of the closure and the tamper ring such that co-operation between the said means or any of them on the skirt and the tamper ring tends to prevent rotational force on the tamper ring during application from severing the frangible bridges connecting the tamper ring to the skirt of the closure.

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Patent Request : Provisional Application

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For application details follow (Please print) >

(1) **Applicant:** CTECH EQUIPMENT PTY LTD. Customer number

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Invention Title: IMPROVEMENTS IN PLASTIC CLOSURE SEAL AND TAMPER INDICATOR OPERATION AND PRODUCTION

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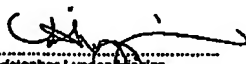
Signature(s): **Date:** 3/2/04


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Various means of employing an additional foil seal to ensure freshness of the contents of a container and which may include a means to pierce the foil.

Utilising a closure with tabs or projections extending inward towards the neck of the container and in one non limiting embodiment, also extending upwards to engage the tamper bead on the container neck but also to be shaped so as the leading edge of at least one tab upon removal rotation engages with a angled face means on the container neck.

The present invention also extends in a non limiting manner to any one or more of the foregoing aspects combined.


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